

Title of Invention: RUSH HOUR MODELING FOR
ROUTING AND SCHEDULING
Inventor(s) Name: Heaps, et al.
Attorney Docket No.: 018360/260844

Sample Set of Modified Rush Hour Travel Speeds

Geographic Area/Road Segment	Normal Travel Speed	Travel Speed during Time Window #1	Travel Speed during Time Window #2	Travel Speed during Time Window #3
Road 1 in Area 1	45 mph	31.5 mph (30% slower)	36 mph (20% slower)	31.5 mph (30% slower)
Road 2 in Area 1	50 mph	35 mph (30% slower)	40 mph (20% slower)	35 mph (30% slower)
Road Segment X	30 mph	20 mph (30% slower)	0 mph (Travel restriction)	20 mph (30% slower)
Road Segment Y	65 mph	45.5 mph (30% slower)	0 mph (Travel restriction)	45.5 mph (30% slower)
All Areas and Roads to which no new traffic rules were defined to apply.	Normal Speed	Normal Speed	Normal Speed	Normal Speed

FIG. 1

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Travel Matrix for "Normal" Traffic Conditions

	Location 1	Location 2	Location 3	Location 4
Location 1	----	10 minutes	15 minutes	20 minutes
		2 miles	3 miles	4 miles
Location 2	10 minutes	----	5 minutes	10 minutes
	2 miles		1 mile	2 mile
Location 3	15 minutes	5 minutes	----	5 minutes
	3 miles	1 mile		1 mile
Location 4	20 minutes	10 minutes	5 minutes	----
	4 miles	2 miles	1 mile	

FIG. 2A

**Travel Matrix for a Particular Time Window
with a 20% Slower Speed Variation**

	Location 1	Location 2	Location 3	Location 4
Location 1	----	15 minutes	18 minutes	24 minutes
		3 miles	3 miles	4 miles
Location 2	15 minutes	----	6 minutes	15 minutes
	3 miles		1 mile	2 miles
Location 3	18 minutes	6 minutes	----	6 minutes
	3 miles	1 mile		1 mile
Location 4	24 minutes	15 minutes	6 minutes	----
	4 miles	2 miles	1 mile	

FIG. 2B

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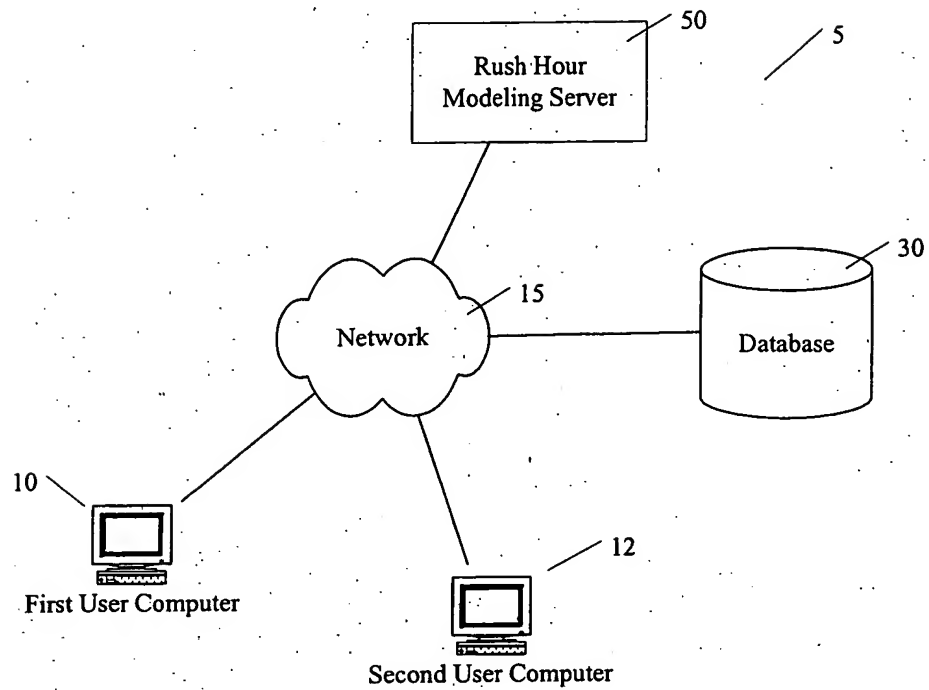


FIG. 3

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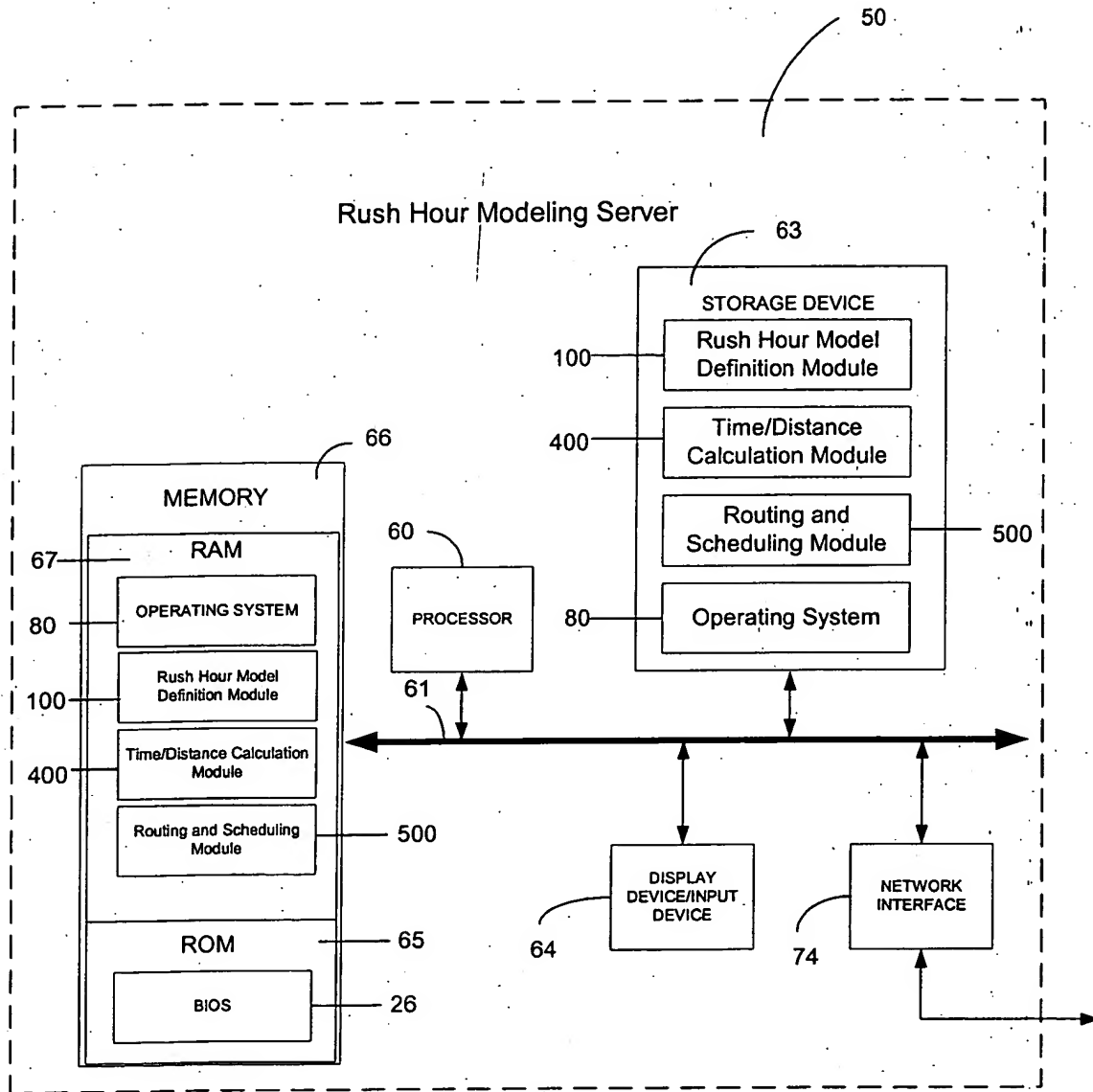


FIG. 4

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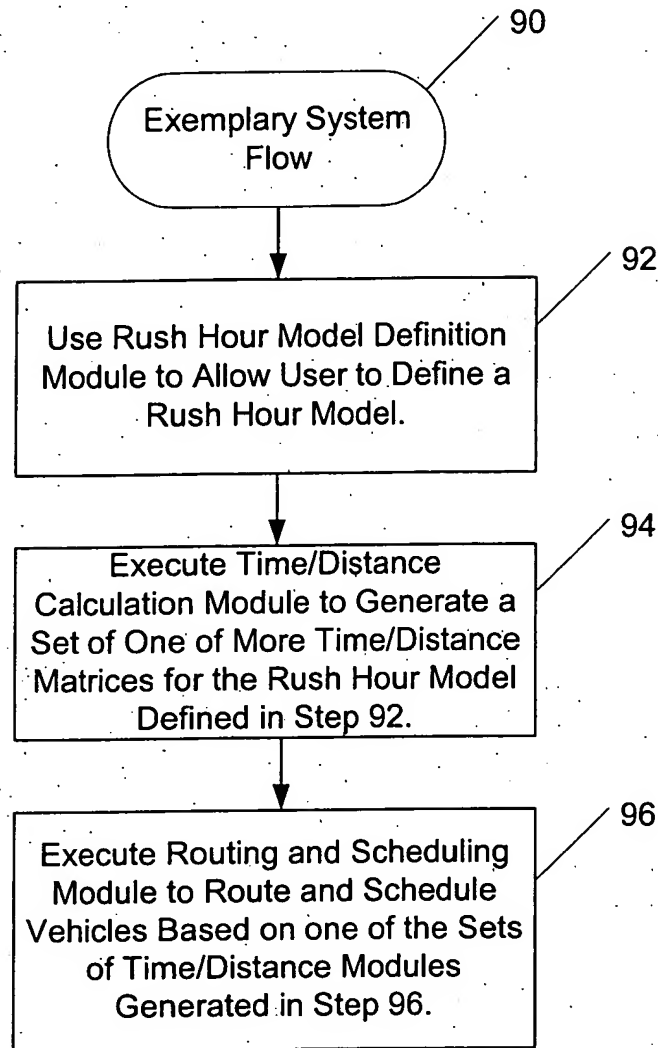


FIG. 5

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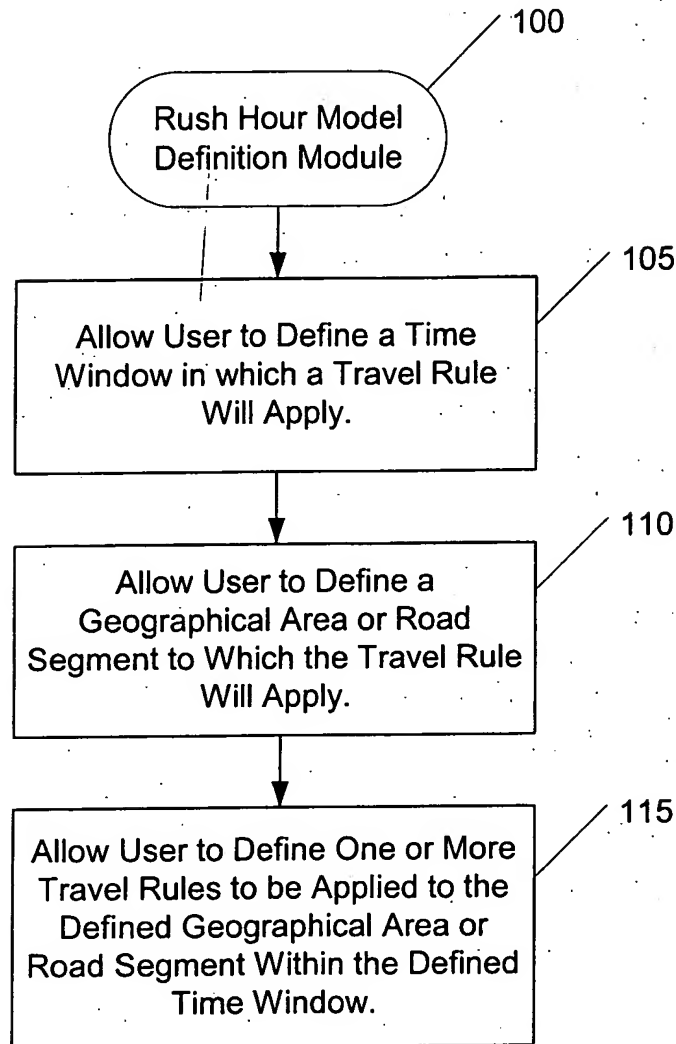


FIG. 6

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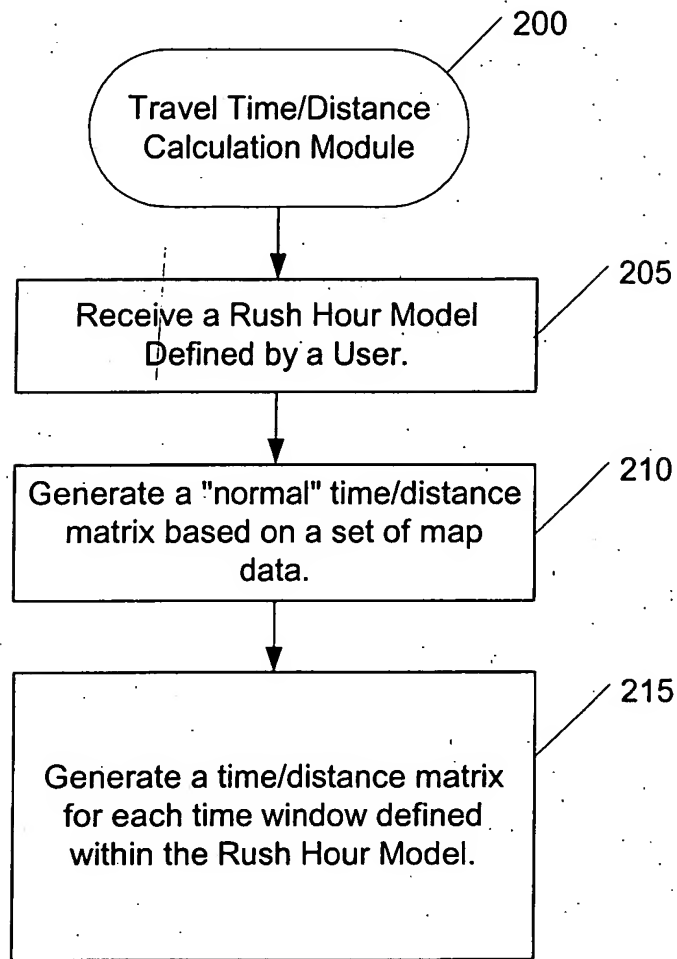


FIG. 7

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606

600

608

610

612

614

616

618

The screenshot shows a software window titled "Edit Rush Hour Model / 1 of 1 record(s)". It contains three sections for defining time periods. The first section, "Time Period 1", is enabled and named "Morning" (608), with a start time of 6:00 (610) and an end time of 9:00 (612). It has a "Global Speed Variation" of 15% (614) and is set to "Faster" (618). The second section, "Time Period 2", is disabled and named "Midday", with a start time of 11:00 (614) and an end time of 13:00 (616). It has a "Global Speed Variation" of 0% and is set to "Slower". The third section, "Time Period 3", is enabled and named "Afternoon", with a start time of 16:00 and an end time of 19:00. It has a "Global Speed Variation" of 25% and is set to "Faster". The status bar at the bottom indicates "Ready" and "Modified by ADMIN on 2/9/2003 19:45".

Time Period	Name	Start	End	Global Speed Variation	Speed Setting
Time Period 1	Morning	6:00	9:00	15%	Faster
Time Period 2	Midday	11:00	13:00	0%	Slower
Time Period 3	Afternoon	16:00	19:00	25%	Faster

FIG. 8

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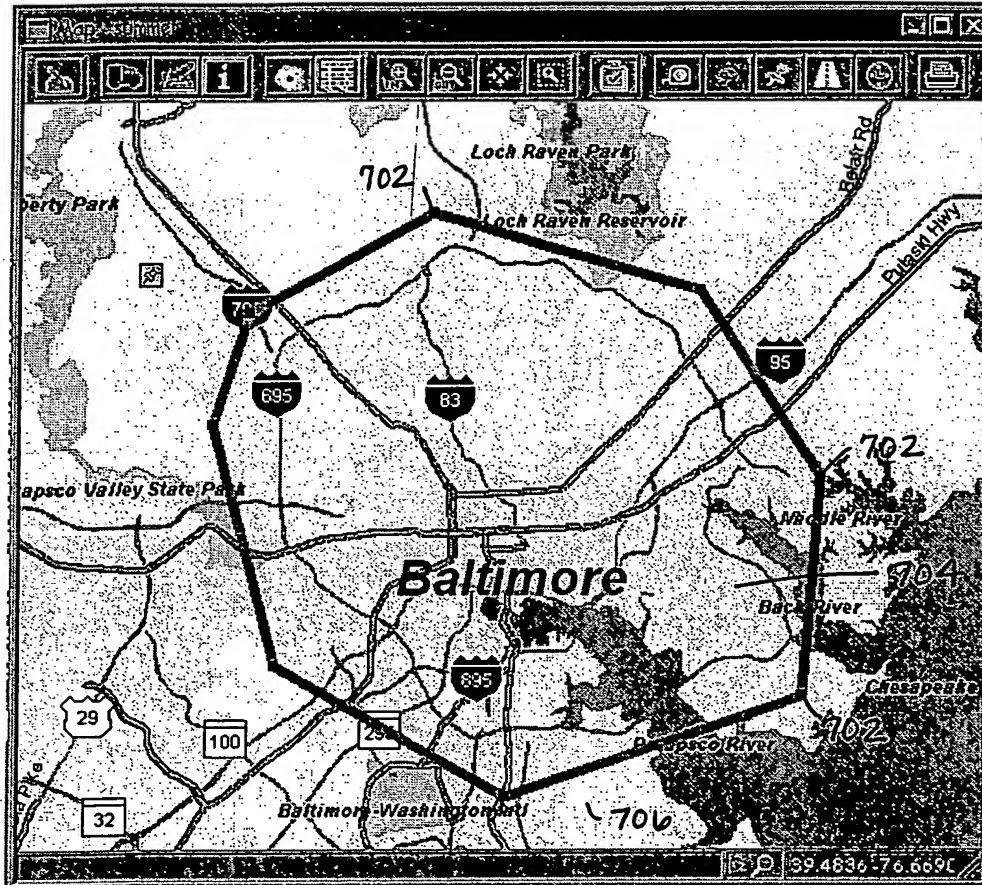


FIG. 9

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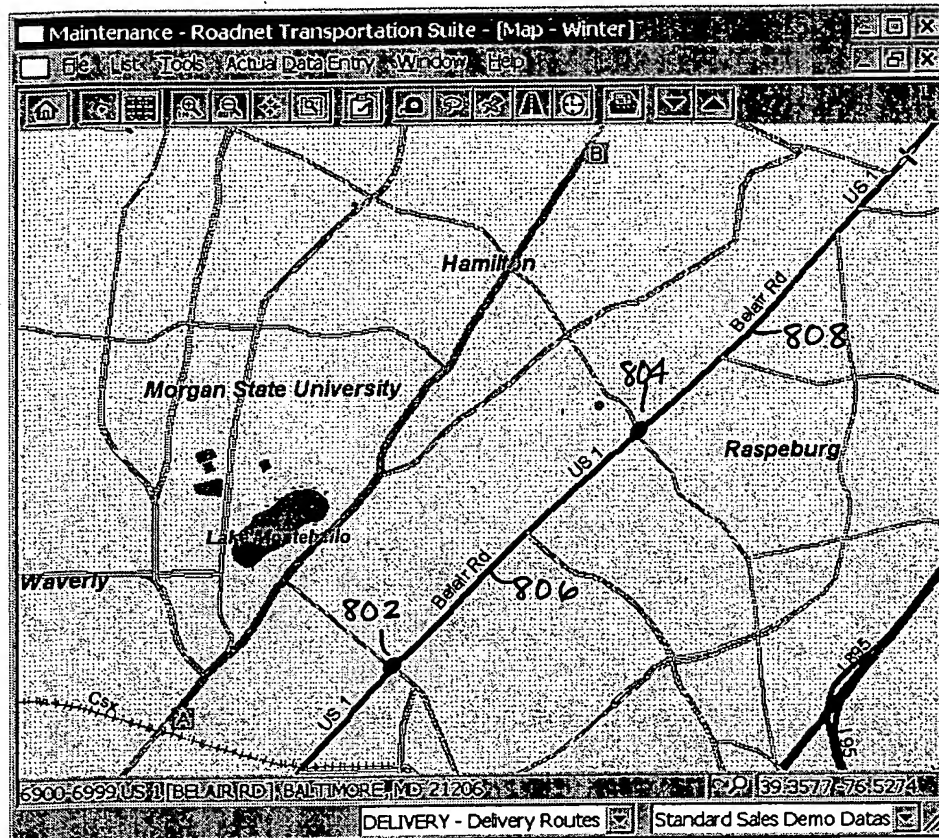


FIG. 10

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Rush Hour Area Attributes - Winter

Name: 902 Baltimore Description: 916 Metro Baltimore Priority: 1

☒ Simple ☐ Advanced 905

904 Speed Variation 906 Advanced Speed Variation 914 Travel Restriction 900

Time Period 1: 06:00 - 09:00 Time Period 2: 16:00 - 19:00 Time Period 3: Not Enabled

Speed Variation: 908 40 910 ☒ Faster ☐ Slower 912 35 ☒ Faster ☐ Slower 70 ☒ Faster ☐ Slower

OK Cancel

FIG. 11

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Rush Hour Area Attributes - Winter

Name: Description: Priority:

☐ Simple ☒ Advanced

☒ Speed Variation ☐ Advanced Speed Variation ☐ Travel Restriction

Road Class	Time Period 1 06:00 - 09:00	Time Period 2 16:00 - 19:00	Time Period 3 Not Enabled
Interstate	<input checked="" type="checkbox"/> 45 <input type="checkbox"/> Faster <input type="checkbox"/> Slower	<input checked="" type="checkbox"/> 40 <input type="checkbox"/> Faster <input type="checkbox"/> Slower	<input type="checkbox"/> 0 <input type="checkbox"/> Faster <input type="checkbox"/> Slower
Primary	<input checked="" type="checkbox"/> 30 <input type="checkbox"/> Faster <input type="checkbox"/> Slower	<input checked="" type="checkbox"/> 30 <input type="checkbox"/> Faster <input type="checkbox"/> Slower	<input type="checkbox"/> 0 <input type="checkbox"/> Faster <input type="checkbox"/> Slower
Secondary	<input checked="" type="checkbox"/> 20 <input type="checkbox"/> Faster <input type="checkbox"/> Slower	<input checked="" type="checkbox"/> 20 <input type="checkbox"/> Faster <input type="checkbox"/> Slower	<input type="checkbox"/> 0 <input type="checkbox"/> Faster <input type="checkbox"/> Slower
Local	<input type="checkbox"/> 10 <input type="checkbox"/> Faster <input type="checkbox"/> Slower	<input type="checkbox"/> 10 <input type="checkbox"/> Faster <input type="checkbox"/> Slower	<input type="checkbox"/> 0 <input type="checkbox"/> Faster <input type="checkbox"/> Slower

OK Cancel

FIG. 12

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Rush Hour Path Attributes - Winter

Name: I-795 Description: I-795 West

Morning: 06:00 - 09:00 **1104** Midday: Not Enabled Afternoon: 16:00 - 19:00

Speed Variation: ☐ 0% ☒ Faster ☐ Slower ☐ 1% ☒ Faster ☐ Slower ☒ 60% ☒ Faster ☐ Slower

Travel Restriction: ☒ Restricted ☐ Restricted ☐ Restricted

Travel Direction: **1114** ☒ No Change ☐ Both Ways ☐ One Way A to B ☐ One Way B to A ☒ No Change ☐ Both Ways ☐ One Way A to B ☐ One Way B to A ☒ No Change ☐ Both Ways ☐ One Way A to B ☐ One Way B to A

OK Cancel

1100

FIG. 13

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1201

1200

1204

1206

1212

1210

FIG. 14

1201

General

Type ID

1

Description

24 FT ST

General Info

Weight

0.0000

Height

9.999.9999

Cost Info

Fixed

0.0010

Variable

1.0000

Sizes

		Frozen	Dry	Reing
Cases	500	1	0	0
Weight	550	2	0	0
Cube	12,500	3	0	0

☒ Prohibited from Restricted Rush Hour Areas and Paths

Ready

Modified by: TFM on 4/25/2000 23:24

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Rush Hour Area Attributes - Winter

Name: Description: Priority:

☐ Simple ☒ Advanced

Speed Variation **Advanced Speed Variation** **Travel Restriction**

Road Class	Morning 05:00 - 09:00	Midday Not Enabled	Afternoon 16:00 - 19:00
Interstate	<input type="checkbox"/> Restricted	<input type="checkbox"/> Restricted	<input type="checkbox"/> Restricted
Primary	<input checked="" type="checkbox"/> Restricted	<input type="checkbox"/> Restricted	<input checked="" type="checkbox"/> Restricted
Secondary	<input checked="" type="checkbox"/> Restricted	<input type="checkbox"/> Restricted	<input checked="" type="checkbox"/> Restricted
Local and Ramps	<input checked="" type="checkbox"/> Restricted	<input type="checkbox"/> Restricted	<input checked="" type="checkbox"/> Restricted
	<input type="button" value="All"/>	<input type="button" value="All"/>	<input type="button" value="All"/>

1312

A check on this page means restricted equipment types cannot use roads of that class during that time period.

OK Cancel

1300

FIG. 15

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1402

1400

1404

1406

1408

1410

1412

1414

Ready

Modified by ADMIN on 2/8/2003 10:11

The screenshot shows a software window titled "Edit Routing Session / 1 of 1 record(s)". The window contains several input fields and checkboxes. At the top, there is a "Planned Delivery Date" field with a calendar icon, showing "2/7/2003", and a "Scenario" dropdown menu set to "DELIVERY". Below these is a "Description" text box containing the word "Delivery". To the right of the description is a checkbox labeled "Combine Orders" which is checked, and another checkbox labeled "DOT Tracking" which is unchecked. Below the description is a "Time/Distance Calculation" section with a radio button for "XY" and a checkbox for "Use Barriers". Below this is a radio button for "RouteNet" which is selected, and a checkbox for "Advanced Rush Hour (consider alternative streets)" which is checked. Below the "RouteNet" section is a "Rush Hour Model" dropdown menu set to "Winter". To the right of the "Advanced Rush Hour" checkbox is a "Valid Delivery Days" section with a grid of checkboxes for the days of the week (M, T, W, R, F, S, U), all of which are checked. The status bar at the bottom left says "Ready" and the bottom right says "Modified by ADMIN on 2/8/2003 10:11".

FIG. 16

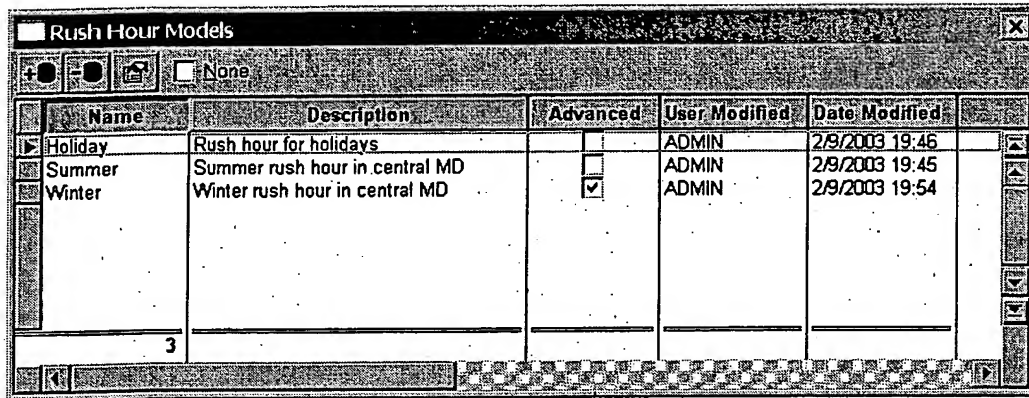
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1500

Name	Description	Advanced	User Modified	Date Modified
Holiday	Rush hour for holidays	<input type="checkbox"/>	ADMIN	2/9/2003 19:46
Summer	Summer rush hour in central MD	<input type="checkbox"/>	ADMIN	2/9/2003 19:45
Winter	Winter rush hour in central MD	<input checked="" type="checkbox"/>	ADMIN	2/9/2003 19:54

3

FIG. 17